

## V. SOME CRETACEOUS MAMMALS FROM THE LANCE FORMATION.

BY GEORGE GAYLORD SIMPSON.

The Carnegie Museum possesses an important collection of mammals from the Lance Formation made in 1900 by J. B. Hatcher at the classical localities in Niobrara County, Wyoming, where Marsh obtained all his mammalian specimens of this age. Through the kindness of Mr. O. A. Peterson, this collection was recently submitted to me for study, and some notes upon it are here presented.

Like all collections from this formation, the specimens are chiefly isolated teeth, difficult to study and to interpret. So far as possible, this material will be made the subject of revision in a forthcoming memoir. The present brief paper is confined to the description and illustration of several somewhat complete, and unique specimens. The most important of these is the lower jaw described below as representing a new genus and species. So many names have already been applied to specimens from the Lance formation, and the taxonomy of the whole mammalian fauna of these beds is so confused, that in general I have preferred to follow Osborn, basing the classification of the Didelphyids of the Lance mainly on the upper molars, and using a few names very broadly to include the different types of dentition, even though by adopting this course each name may eventually be found to cover more than one natural genus. The final solution of the problems involved can eventually only be reached by the acquisition of more complete material showing associated teeth and jaws. Although the application of new names to isolated teeth is now seldom justifiable, as more determinable specimens are found, it will be essential to apply names to them: old names, if possible; new names, if necessary. With the end in view of really fixing the characters of the mammals from the Lance beds two advances are made in this paper. A lower jaw with the dentition more complete than any other known from this formation is described, and inasmuch as it cannot be referred to any of Marsh's genera or species, it is given a name. An upper jaw, also unusually complete, is made the neotype of *Pedionomys elegans* Marsh.

Class MAMMALIA.

Order MARSUPIALIA.

Family DIDELPHYIDÆ.

SUBFAMILY PEDIOMYINÆ.

EUANGELISTES, gen. nov.

Type: *E. petersoni*, sp. nov.

*Diagnosis:* A Pediomysine of medium size. Molar trigonids elevated and sharply cut off from talonids. Trigonids compressed anteroposteriorly. Protoconids and metaconids subequal.  $M_1$  without trigonid basin, paraconid basal, vestigial.  $M_{2-4}$  with paraconids very small and progressively more nearly median.

***Euangelistes petersoni*, sp. nov.**

*Type:* Carnegie Museum Cat. Vert. Foss. No. 11,657. Left lower jaw with  $P_3$  and  $M_{1-4}$ .\*

*Horizon and Locality:* Lance formation, Niobrara County, Wyoming.

*Diagnosis:* Length  $M_{1-4}$ , 7.6 mm.;  $P_3$ , 2.0 mm.; depth of ramus internally below  $M_4$ , 4.0 mm.

$P_3$  is of about the same length as the molars, and, like them, is composed of nearly equal anterior and posterior portions. Anteriorly, however, there is only a single blade-like cusp and the heel is narrow and without basin. The whole tooth is compressed transversely. There is a minute anterior basal cusp, somewhat damaged in this specimen.

The succeeding tooth, although slightly different from those which follow it, is surely a molar. It is fully molariform and its eruption took place before that of  $P_3$ . The structure of the molars is highly characteristic, and does not compare with that of any other Didelphyid. The trigonids are slender and lofty, considerably higher than the talonids, and very sharply separated from the latter. They are unusually short, compressed anteroposteriorly. The metaconid is slightly smaller than the protoconid on  $M_1$ , but on the other molars these cusps are equal save as modified by wear. The paraconid is extremely reduced. On  $M_1$  it is a minute, vestigial basal cuspule. On  $M_{2-4}$  it is higher on the crown, and larger (although still very small), and there is a true short trigonid basin. On  $M_4$  the paraconid is antero-external to the metaconid and nearly median; on  $M_{2-3}$  it is slightly more internal. The heel has in each case the usual three cusps, the hypoconulid and entoconid closely approximated. The talonid of  $M_2$  is wider than the trigonid, those of the other molars slightly narrower than the respective trigonids. On  $M_4$  the hypoconulid projects more posteriorly than on the other molars, but its relationships are the same. On each molar there is a narrow, sharp, steeply inclined antero-external cingulum.

This jaw furnishes further evidence that the majority of the small insectivore-like teeth from the Lance beds really belong to marsupials of didelphyid type. The simple last premolar and four true molars, each six-cusped, with antero-external cingulum and approximated hypoconulid and entoconid, admit of no other interpretation. Among

\* $M_4$  has been lost since the specimen was studied.

the Didelphyids from the Lance formation the genus belongs with the less robust, more *Didelphys*-like group of the *Pediomyinæ*, as shown by its slender premolar, and sharp, elevated trigonids. Of previously named forms *Euangelistes petersoni* can only be closely compared with *Cimolestes incisus* Marsh, which was based upon a single lower molar, 3.6 mm. in length, with elevated trigonid and reduced paraconid. But

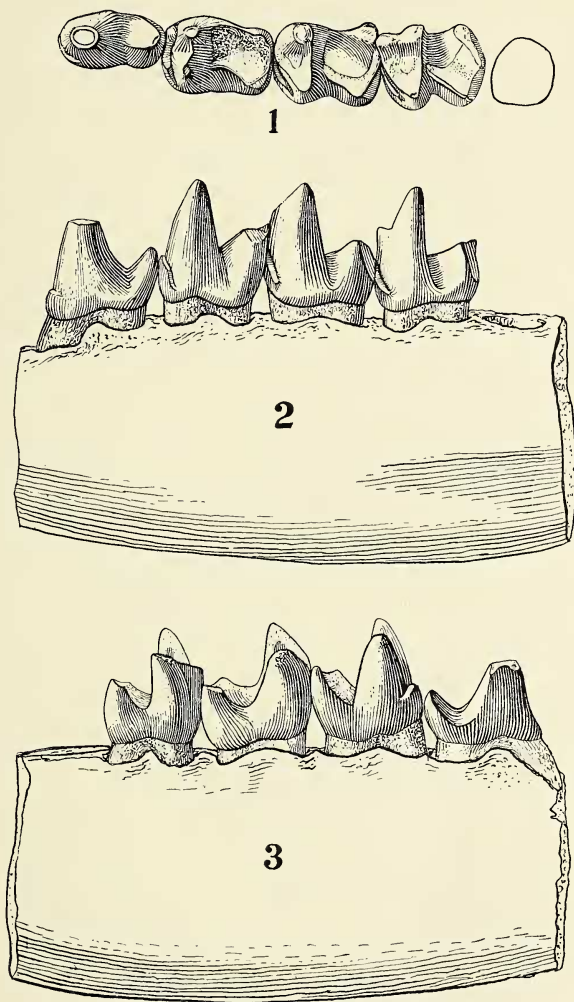


Fig. 1. *Euangelistes petersoni* Simpson. Type. C. M. Cat. Vert. Foss., No. 11,657. Enlarged 5 diam. 1. Crown view; 2. External view; 3. Internal view.

the present molars are little over half as large (each about 2.0 mm. in length) and have relatively shorter trigonids and much smaller paraconids. They differ both specifically and generically from *Cimolestes incisus*. Another tooth figured by Marsh (Amer. Jour. Sci., (3) XLIII, Pl. X, Fig. 5) as a lower molar and referred by him to *Cimolestes incisus*, but which apparently does not belong to that species, may be an  $M_1$  referable to *Euangelistes*, although the disparity in height between trigonid and talonid appears to be less than in *E. petersoni*.

The upper molars of *Euangelistes* are undoubtedly among those, which must still be included in *Pediomys* (*sens. lat.*). In size the specimen is comparable to *Pediomys elegans*; but there are lower teeth, heretofore regarded as generically distinct, which might well fit and conform to the upper teeth of this form.

**Pediomyinæ, gen. et sp. indet.**

Another specimen, Carnegie Mus. Cat. Vert. Foss., No. 11,656, represents a small *Pediomyine* with an extremely slender horizontal ramus. It is a left lower jaw with  $M_{1-2}$ . Smaller than *Euangelistes petersoni*, it is also very different in structure and considerably more like the post-Cretaceous *Didelphyids*. The trigonid is low, with normally developed cusps, the proportions of protoconid, metaconid, and paraconid, which are progressively smaller in the order named, much as in *Peratherium* or *Didelphys*. The trigonid of  $M_1$  is elongate and compressed transversely. This tooth is 1.6 mm. in length, and

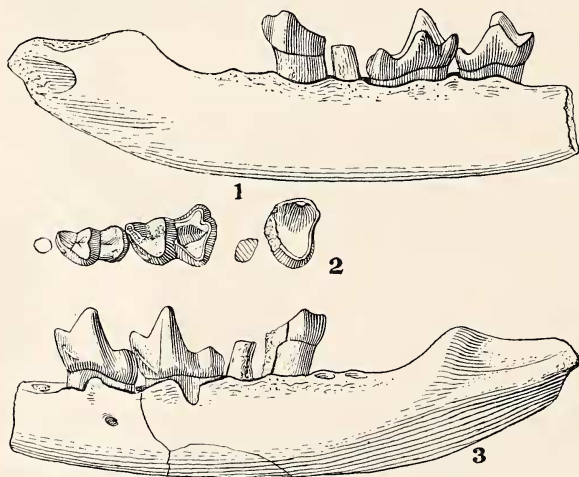


Fig. 2. *Pediomyinæ, gen. et sp. indet.* C. M. Cat. Vert. Foss., No. 11,656. Enlarged 7.5 diameters. 1. Internal view; 2. Crown view; 3. External view.

the depth of the ramus below it internally is only about 1.5 mm. This exact type of Lance lower teeth has never received a name and it is not proposed to base one on this material. Similar, but larger, teeth were referred by Marsh to *Batodon* and *Pedimys*, but without direct evidence of true association with either genus in a restricted sense. Slight variants of this pattern, ranging from this minute size up to molars about 3 mm. in length are common in the Lance and belong to the *Pedimys*-group.

### *Pedimys elegans* Marsh.

Carnegie Museum Cat. Vert. Foss. No. 11,658, is part of a right upper jaw with  $M^{2-4}$ . The molars are didelphyid in number, arrangement, form, and structure. The more important differences from *Didelphys*, believed to be primitive and structurally ancestral, are:

1. Molars more transverse, with distinct equal conules.
2. Paracone and metacone of  $M^{2-3}$  subequal.
3. External cingulum of  $M^{2-3}$  with five styles, the second (opposite the paracone) smallest, the others about equal.
4. Small antero-external cingulum joining first style and anterior conule.

The teeth have the additional, probably not primitive, peculiarity that a slight cingulum passes around the base of the protocone upon the antero-internal and postero-internal faces.

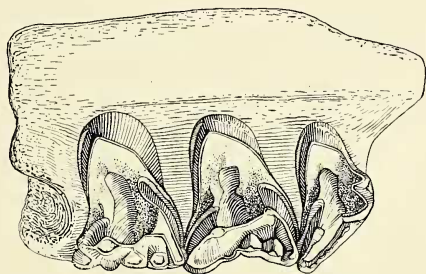


Fig. 3. *Pedimys elegans* Marsh. C. M. Cat. Vert. Foss., No. 11,658. Enlarged 7.5 diam. (Neotype of *P. elegans* Marsh).

Not only does this specimen serve to correct or confirm previous conjectures as to the orientation and affinities of pediomyine upper molars, but it also fixes the exact significance of the name *Pedimys elegans*, the first name applied to any of the smaller Lance tritubercular upper molars. The type of this species is Yale Peabody Museum, No. 11,866, a single upper molar, broken and weathered. This

poorly preserved type is of the same size and, so far as can be determined, of the same structure as  $M^3$  of the present specimen, and the latter may be designated as a neotype.

Order **MULTITUBERCULATA.**

Family **PTILODONTIDÆ.**

***Cimolomys*, sp. indet.**

Occasion is here taken to figure two interesting and unusually good specimens of smaller Lance Ptilodontids, referable to *Cimolomys* in a

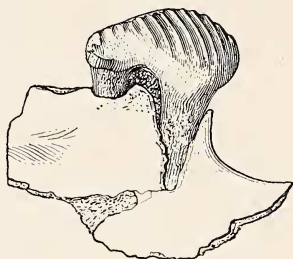


Fig. 4. Right lower premolar of *Cimolomys*, *sp. indet.* C. M. Cat. Vert. Foss., No. 11,660. Enlarged 4.5 diameters.

broad sense. One, Carnegie Museum Cat. Vert. Foss. No. 11,660, is a right lower jaw with the shearing premolar in place. (Fig. 4.) This is a relatively long and low tooth, typically ptilodontid, originally with thirteen or fourteen serrations on the shearing edge. The second, Carnegie Museum Cat. Vert. Foss., No. 11,661, is part of a right lower jaw with the two molars.  $M_1$  is long and narrow, with a cusp formula

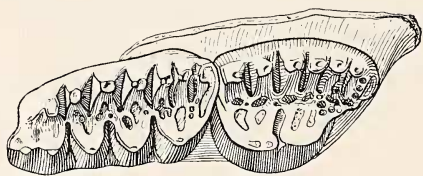


Fig. 5. Right lower molars of *Cimolomys*, *sp. indet.* C. M. Cat. Vert. Foss., No. 11,661. Enlarged 7.5 diameters.

of 8-5.  $M_2$  is relatively larger than in most members of this family, and has a high number of external cusps, those posterior with confluent bases, as is usual. (Fig. 5.) The formula is 6-2. The shapes of the cusps and the complex ridge pattern, seen in the figures, are characteristic of the family.



**Meniscoëssus**, sp. indet.

Carnegie Museum Cat. Vert. Foss. No. 11,659, is a right M<sup>1</sup> referable to this larger genus. (Fig. 6.) Being nearly unworn it shows

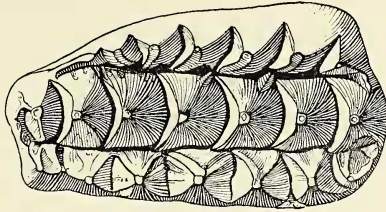


Fig. 6. Right upper molar of *Meniscoëssus* sp. indet. C. M. Cat. Vert. Foss., No. 11,659. Enlarged 5 diameters.

the high strongly selenodont complex of cusps of *Meniscoëssus* to advantage and is figured for this reason.